The DEETER Group®

Deeter Leak Detector

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1. Summary

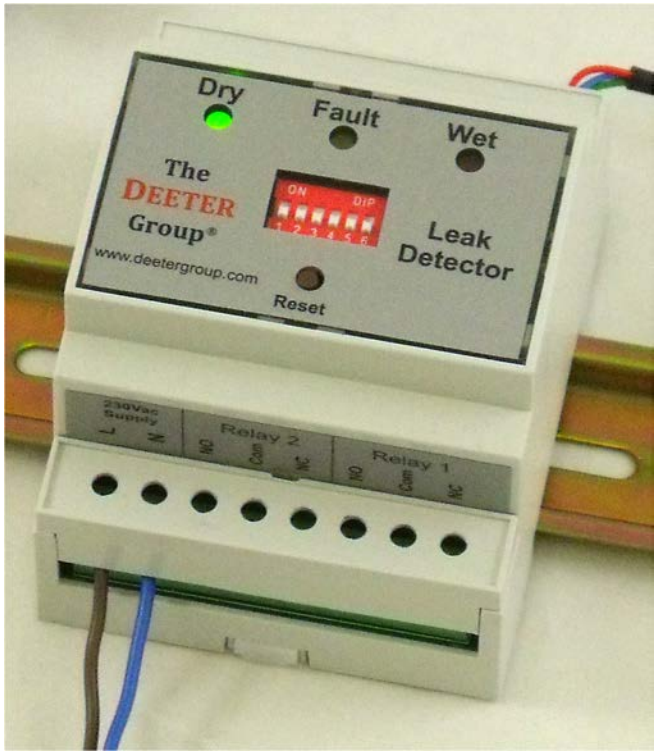
The Deeter Leak Detector comprises a **Leak Detect Controller** and a set of **Leak Sensors**. The Controller will respond to a leak detected at any one of the Sensors.

The Controller provides an LED indication of the system status and has relays and a transistor output that may be used to directly drive pumps and alarms, or may be used to interface to other equipment, such as Programmable Logic Controllers (PLC), Building Management Systems (BMS) and dial-up alarms systems.

The Controller has a wide range of power supply options, with separate inputs for mains-voltage supplies (220-240VAC) and low-voltage supplies. Low-voltage supplies can range between 8-24V AC and 10-32V DC.

A number of user-selectable options are provided by a bank of 6 switches behind the Controller front panel. These are visible through the front panel but only accessible with the panel removed, so cannot accidentally be changed.

2. Leak Detect Controller



The Leak Detect Controller is housed in a UL94-V0 flame retardant case that will fit to standard 35mm DIN rail.

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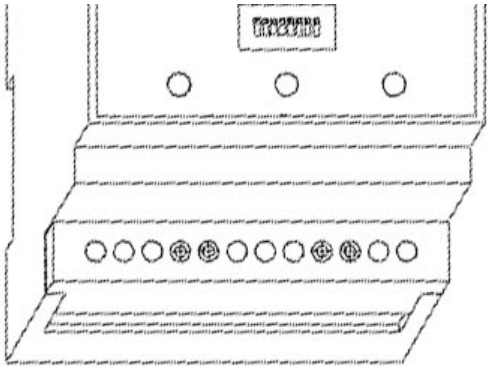
2.1 Controller Electrical Connections

All electrical connections are made via two rows of screw terminals as shown in the following table:

Top Row	Terminal No. (left to right)	Function
	1	Leak Sensor supply output +ve
	2	Leak Sensor input
	3	Leak Sensor supply output –ve
	4	0V
	5	Alarm output (open-collector transistor)
	6	Unregulated output
	7	Power supply input –ve
	8	Power supply input +ve



The top row (5mm spacing) has terminals grouped in twos and threes according to function and are used for low-voltage connections only (less than 50V).

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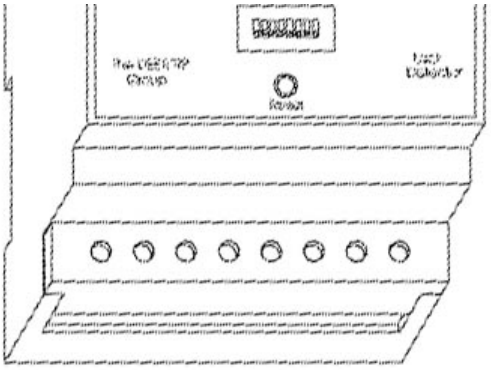
Bottom Row	Terminal No. (left to right)	Function
	1	Mains supply 'Live' (230VAC)
	2	Mains supply 'Neutral'
	3	Relay 2 NO (normally-open contact)
	4	Relay 2 COM (common contact)
	5	Relay 2 NC (normally-closed contact)
	6	Relay 1 NO
	7	Relay 1 COM
	8	Relay 1 NC



The bottom row (7.5mm spacing) may be used for connecting mains-supply voltages (220V-240V) or low voltages if the Controller is not powered by mains. (Mixing mains and low voltages on the bottom row of terminals is not recommended for electrical safety reasons).

There are two pairs of power supply terminals: a low-voltage pair on the top row and a mains voltage pair on the bottom row. Connect to one pair only. The low voltage pair will accept AC voltages from 8V to 24V, or DC voltages between 10V and 32V.

The unregulated output is a DC voltage derived from the supply (AC, DC or mains) and the voltage level will depend on the supply and load. It may be used to power external devices with return current via the 0V or 'Alarm' terminals.

The open-collector transistor 'Alarm' output is current-limited to sink up to 50mA and can be pulled up to 40V. It is open during normal operation and can be used in conjunction with the unregulated supply output to drive an external relay. It may also be used to interface to other equipment, such as a PLC or BMS, or it can be connected to the Leak Sensor input of another Leak Controller to provide additional relay contacts.

The relays have a current rating of 6A at 250VAC.

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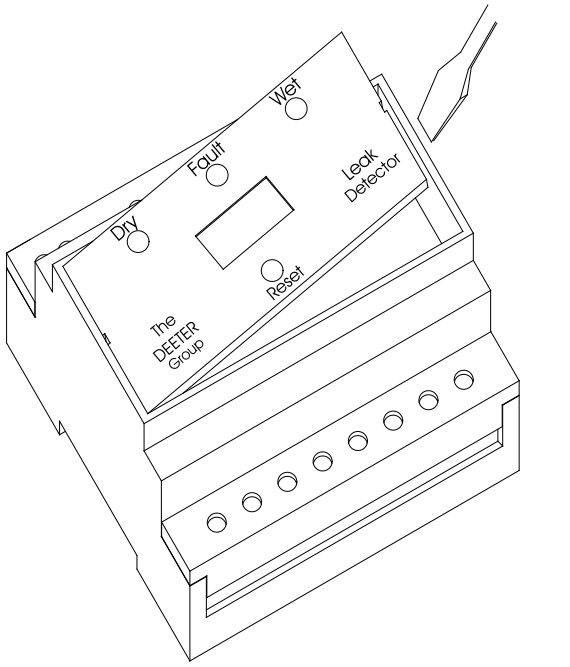
2.2 LED Indicators

There are three LED indicators on the top panel: green, yellow and red. These show the current state of the Leak Detect Controller as follows:

Operating State	Green	Yellow	Red
System okay – no leak or line fault	On		
Leak detected			On
Leak latched (leak has passed)			Flashing
Fault detected		On	
Leak latched and fault detected		On	Flashing

2.3 Option Switches

There are six DIP switches on the top panel, used to select a range of options. To gain access to the switches, prise off the top panel using a flat bladed screwdriver in the gap to the left or right-hand side of the cover.



The switches have the following functions:

Switch No.		OFF (down)	ON (up)
1	Relay 2	Assigned to Leak	Assigned to Fault
2	Alarm	Assigned to Leak	Assigned to Fault
3	Relay 1	Follows	Latches
4	Relay 2	Follows	Latches
5	Alarm	Follows	Latches
6	Relay1&2 default	Off	On

Relay 1 is always assigned to leak detection.

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If there is a fault detected on the Leak Sensor line, Relay 2 and/or the Alarm output can be used to indicate the fault. Fault conditions include:

- A break on any of the three Leak Sensor wires
- Poor termination of the Leak Sensor wires
- Blown output fuse

The Alarm output and both relays can be set to follow a leak condition or to latch. If following, the output will change back when conditions are dry. If latching, the outputs will remain on, even after a leak has been cleared. Pressing the Reset button on the top panel will unlatch the outputs and return the Controller to its quiescent state.

Fault outputs are not latched and always return to normal once the fault condition has been cleared. If an output is assigned to fault and also selected to latch, the red indicator will flash after a leak has cleared. In this configuration, although there may not be any latched outputs, a temporary leak event can be indicated until the operator presses the reset button.

The relays can be configured to connect power or remove power to equipment when a leak (or fault) is detected by using either the NC or NO contacts. Switch 6 allows this choice to be based on fail-safe conditions. With no power to the Controller, the NO contacts will be open and the NC contacts will be connected to COM. The fail-safe configuration should be based on this condition and the choice of whether the relays should default to on or off will then depend on the type of equipment attached.

Example1. A pump must come on when a leak is detected but remain off if the detector system is switched off. Use the NO contacts and set Switch 6 so that relays default to Off.

Example 2. A siren must sound if a leak is detected or if the detector system is switched off. Use the NC contacts and set Switch 6 so that relays default to On.

Isolation of both supply lines may be a requirement for some mains-powered equipment. The two single-pole relays can be used as a double-pole relay if they are both assigned to leaks and both set to latch or follow in the same manner.

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3. Leak Sensors

Leak Sensors are housed in ABS enclosures with a pair of stainless steel sensing probes protruding through the underside. The probes will detect ‘normal’ water to a depth of around 1 to 2mm. They will detect other conducting fluids or purer water but may require greater depth of contact with the fluid. To achieve greater contact, or to enable the probes to reach further, they can be extended using an M3 threaded spacer.

Sensors are linked using a 3-wire cable in a daisy-chain configuration. Screw terminals are provided for connections from the Controller (or previous Sensor in the chain) and out to the next Sensor in the chain. The last Sensor in the chain must terminate the wires so that if a wire becomes broken, the Controller can detect the break and report a fault.

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Sensor with lid removed showing line terminating connections

Screw terminals must be kept dry, so cables are fed through cable glands and the box lid can be sealed to IP65. Remove the lid to reveal the screw terminals, which have the following functions:

6-way	Terminal No. Terminal 1 is opposite terminal 1 on the 3-way connector	Function
	1	Power supply +ve
	2	Common sensor output / Line termination – connect to 4
	3	Power supply –ve
	4	Line termination – connect to 2
	5	Line termination – connect to 6
	6	Line termination – connect to 5

3-way	Terminal No. Terminal 1 is close to the side of the enclosure	Function
	1	Power supply +ve
	2	Common sensor output
	3	Power supply –ve

The line-termination connections are for the final Leak Sensor in the chain. Remember to seal the unused cable gland on the final Sensor.

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Sensors have two mounting holes that can be used to bolt them to the floor if required. The mounting holes are accessible with the lid removed.

Please note that although a break in the wires connecting the sensors will be detected automatically, in the unlikely event of a sensor failure, there will be no indication of a fault. All Leak Sensors should therefore be tested periodically to confirm that they are functioning correctly by placing the probes in the fluid they are required to detect.

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Specifications

Controller dimensions:	90mm high x 71mm wide x 58mm deep 35mm DIN rail mounting
Sensor dimensions:	100mm (including cable glands) x 64mm x 40mm high
Sensor probes:	Pair, 5mm long, stainless steel, M3 thread, spaced at 20mm centres
Mains power supply option:	220VAC – 240VAC at 20mA
Low-voltage supply option:	10VDC – 32VDC at 200mA 8VAC – 24VAC at 200mA
Relay contacts:	6A at 250VAC
'Alarm' transistor output (resistive loads):	Current limited to maximum 50mA Maximum pull-up voltage, 40VDC.
Maximum number of Sensors:	25
Maximum cable length:	typically 2000m, depending on wire resistance
Mains supply fuse:	32mA anti-surge, 5x20mm cartridge
Low-voltage supply fuse:	500mA anti-surge, Omni-Blok® cartridge
Sensor output fuse:	375mA anti-surge, Omni-Blok® cartridge
Unregulated output fuse:	100mA anti-surge, Omni-Blok® cartridge

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